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## **Extensibility of the human Achilles tendon during isometric contraction: an in vivo MRI study**

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The present study examined in vivo deformation of the entire Achilles tendon in both longitudinal and transverse directions during isometric contractions. A series of sagittal (18 s) and cross-sectional (36 s) magnetic resonance (MR) images of the Achilles tendon were taken while the 12 subjects performed voluntary isometric plantar flexions at 0% (rest), 30% and 60% of the maximal contraction. The Achilles tendon was divided into proximal and distal portions that were separated at the distal end of the soleus muscle belly, and the length and width of each portion were determined from the MR images. Longitudinal and transverse strains were calculated as changes in relative

length and width compared with those at rest. The proximal portion of the Achilles tendon was extended both in longitudinal and transverse directions by 1.6% and 13.9%, respectively, while the distal portion expanded longitudinally (3.3%) and narrowed transversely (-4.6% at the distal region). Thus, the contraction induced Achilles tendon deformation was bi-directional, with different amounts between locations. These changes may be attributed to the multi-directional contractile forces of the triceps surae muscle fibers and the deformation of the soleus muscle belly that is attached onto the proximal portion of the Achilles tendon.

## **The influence of Lactobacillus b240 intake on oral immune system in rats model**

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Secretory immunoglobulin A (SIgA) plays a major role of mucosal immunity. Reportedly, it has been suggested that lactobacillus L.plantarum ONRIC b240 (b240) intake could increase IgA secretion in peyer's patch of mice. The purpose of this study was to examine

whether b240 increase salivary IgA in rats. 8-weeks male Wistar rats were injected samples orally every day for 3 weeks. b240 suspension were administrated 2 ml per day. b240 was suspended into saline for 20, 100 and 500 mg/kg body weight. Rats were measured their body

weight two times per week. Saliva samples were collected before administration (B) and after 1 (A1), 2 (A2) and 3 weeks (A3) of administration. Salivary secretion was stimulated by intraperitoneal injection of pilocarpine 5 mg/kg body weight. Measurement of salivary IgA concentration was Enzyme-Linked Immunosorbent Assay. Body weights did not differ among each groups. Salivary IgA concentrations in

0mg/kg, 20 mg/kg, and 100 mg/kg groups did not show significant change during study period. Although salivary IgA concentration in 500 mg/kg group were not significantly changed at B, A1 and A2, those at A3 was significantly increased ( $p<0.05$ ). In conclusion, 500mg/kg b240 intake could increase salivary IgA concentration in rats.

### **Awareness of role of strength training in care prevention, negative perception, and stages of change for strength training behavior among Japanese older adults**

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The purpose of the present study was to examine the associations among awareness of the role of strength training in care prevention, negative perception of strength training, and stages of change for strength training behavior among Japanese older adults. A cross-sectional questionnaire survey was conducted to 1124 older adults (60-74 years) randomly sampled from the Tokorozawa city. Regarding the research items, the dependent variable was stages of change for strength training behavior, and the independent variables were awareness of the role of strength training in care prevention and negative perception of strength training. Analysis of covariance was utilized. After adjusting for demographic variables (age, self-reported health status, body pain, and smoking habits), higher awareness

( $p<.0001$ ) and lower negative perception ( $p<.0001$ ) were significantly associated with higher stages of change. In post-hoc analysis, significant differences of the awareness were revealed among precontemplation, contemplation, and other 3 stages. In the perception, significant differences were revealed between precontemplation and other 4 stages, and between contemplation and maintenance. Although the data is insufficient to determine causal relationships, these results indicate that promoting the awareness of the role of strength training in care prevention and modifying negative perception might effective strategies to encourage strength training among older adult, especially for those in earlier stages.

### **Effects of rowing training on abdominal muscle and fat in elderly men**

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The purpose of this study was to examine the effects of rowing training on abdominal muscle and fat size in elderly men. In cross-sectional study, we compared the cross-sectional areas (CSAs) of abdominal muscle and fat measured by MRI in 16 elderly male rowers (ROW: age,  $67.8 \pm 2.3$  yr) and in 18 untrained men (CON:  $66.2 \pm 3.0$  yr). ROW had a 20% larger total abdominal muscle CSA than CON ( $P < 0.01$ ); rectus abdominis, psoas major and erector spinae were 27%, 64% and 14% larger in ROW than in CON ( $P < 0.05$ – $0.001$ ), respectively. On the other hand, there were no differences in visceral and subcutaneous fat CSAs

between the two groups. In intervention study, nine sedentary elderly men ( $71.8 \pm 4.4$  yr) trained on rowing ergometer for 24 weeks at three times/wk. In response to 24 week-rowing training, total abdominal muscle, rectus abdominis, psoas major and quadratus lumborum CSAs increased by 6%, 11%, 23% and 10%, respectively ( $P < 0.05$ – $0.001$ ). Subcutaneous fat CSA decreased by 17% ( $P < 0.01$ ), but no change was observed for visceral fat CSA. These findings suggested that rowing training is a valuable tool for increasing abdominal muscle size, especially rectus abdominis and psoas major, for elderly men.

### **Effect of the different depth of the water on muscle activity during exercise in water**

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The purpose of this study was to examine whether the different depth of the water influences muscle activity of lower extremities during the same exercise in water. Six healthy young men performed during forward walk, jump, one-leg swing, and standing position; simultaneously, EMG data was collected from the rectus femoris, tivialis anterior, gluteus maximus muscles, long head of the biceps femoris, medial head of gastrocnemius and soleus. The depth of the water was the axilla, xiphoid process and umbilicus of each participant and water temperature was  $34^\circ\text{C}$ . Almost all

of the muscle activity was greater in the shallow water than in the deep water, but as for standing position, the muscle activity of tivialis anterior was greater the axilla than the umbilicus ( $p < 0.05$ ) and soleus was greater the umbilicus than the axilla ( $p < 0.01$ ). These results indicate that buoyancy and water pressure increase in the deep water, so the weight of the body decrease and it is hard to keep balance. On the other hand, buoyancy decreases in the shallow water, so the muscle activity of antigravity muscles increase. We suggested that exercise with xiphoid process in water may be good for us.

### **Influence on QOL of therapeutic exercise for patients with chronic low back pain**

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【Introduction】 Therapeutic exercise for chronic low back pain is one of the most important conservative treatments. Recently lumbar stabilization exercise focused on deep trunk muscles has attracted considerable attention. Drawing-in and prone bridge (hand - knee) are performed in conjunction with each of the exercises because of its ability to facilitate coactivation of the transverse abdominal muscle and lumbar multifidus muscles when stabilizing the trunk.

【Purpose】 This study investigated the effectiveness of lumbar stabilization exercise for chronic low back pain.

【Methods】 The subjects are 16 chronic low back pain patients (3 males and 13 females, average age: 50.6 yrs). Chronic low back pain was defined as pain which lasts over 3 months. Therapeutic exercises were active transversus abdominis contraction (drawing-in) and

keep prone bridge position (hand-knee). Over one month intervention period, the exercise was conducted. Pain was estimated by Visual Analog Scale and Quality of Life was estimated by JOABPEQ. All evaluated scores after intervention were compared with those before intervention. 【Results and Discussion】 The degree of pain was significantly reduced compared with those before intervention. Four of 5 QOL items were significantly improved after intervention. Despite lower frequency and shorter period than the previous studies of therapeutic exercise for treatment of chronic low back pain, in the present study patients were improved in pain and QOL significantly. The results of this study suggested that lumbar stabilization exercise is effective for patients with chronic low back pain.

## Exercise training modulates M1/M2 macrophage phenotype in adipose tissues of obese mice

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Purpose: Recent investigations suggest that exchange of macrophage phenotype (M1/M2) in adipose tissues is associated with chronic low-grade inflammation in obesity. Although exercise training inhibits inflammatory cytokine gene expressions in adipose tissues, it remains unclear whether exercise training affects a phenotypic switch in adipose tissue macrophage polarization. Therefore, we newly investigated the effect of exercise training on a macrophage phenotypic switch in adipose tissues. Methods: Male C57BL/6 mice were divided into four groups; normal diet (ND) control, ND exercise, high-fat diet (HFD) control, and HFD exercise. Mice ran on a treadmill at 12-20 m/min for 60 min/day, for 16 weeks.

Adipose tissues were obtained from epididymal fat pads. Results: Although mRNA expressions of CD11c and TLR4, which are M1 macrophage specific markers, significantly increased in adipose tissues in the HFD control group, the expressions decreased significantly in the HFD exercise group compared with the HFD control group. Although CD163, a M2 macrophage specific marker, mRNA expression significantly decreased in adipose tissues in the HFD control group, the expression increased significantly in the HFD exercise group compared with the HFD control group. Conclusion: Exercise training induced a phenotypic switch from M1 macrophage to M2 macrophage in adipose tissues of obese mice.

## **Demographic and health-related characteristics associated with awareness of the long-term care insurance system in Korean older adults**

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The purpose of the present study was to examine demographic and health-related characteristics associated with awareness of the long-term care insurance system (LTC) in Korean older adults. The cross-sectional study was conducted, using a questionnaire with 266 elderly people ( $71.3 \pm 4.2$  years, mean  $\pm$  SD.) recruited from the Senior Center in Korea. The survey was conducted in September 2009. The survey included items on awareness of the LTC as the dependent variable, and physical activity levels, self-rated health status, and demographic variables (e.g., gender, age, body mass index, education, income, and

history of present illness) as the independent variables. Overall, 54.5% of respondents were aware of the LTC. Logistic regression analysis revealed that having a higher level of education (OR = 2.60; 95% CI = 1.47 – 4.53), having higher subjective feelings of health (OR = 0.22; 95% CI = 0.12 – 0.39), having a higher level of physical activity (OR = 2.78; 95% CI = 1.30 – 5.73) were associated with the awareness of the LTC. In conclusion, the present study demonstrates that respondents who are aware of the LTC have higher subjective feelings of health and higher levels of physical activity.

## **Effect of short-term strenuous training on sleep**

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The purpose of the present study is to examine the effect of two consecutive days resistance training on sleep. Ten young males participated in the experiment consisting of three consecutive days. The first night was set for baseline night. Subsequent two nights were set as “Ex-1 day (second night)” and “Ex-2 day (third night)”, respectively. On the Ex-1 and Ex-2 day, the subjects performed two bouts of strenuous resistance training (morning and afternoon). Maximal isometric strength, isokinetic strength, and muscle soreness (using visual analogue scale) every morning

were determined to evaluate physical fatigue and muscle damage. During sleep (bedtime from 23:00-07:00), EEG and rectal temperature were continuously recorded. Subjects answered OSA inventory immediately after wake-up. In the previous study, we demonstrated influence of a single bout of intensive exercise during night on sleep. The present findings are expected to indicate the impact of accumulated physical fatigue by two consecutive days of heavy resistance training on sleep. We present preliminary data on the symposium.

## **Influence of Awareness of the Japanese Food Guide on Eating Behavior and Obesity**

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The purpose of the present study was to investigate the influence of awareness of the Japanese Food Guide on eating behavior and obesity. Participants were 1558 Japanese male and female adults (40.2±12.2 years) registered with a social research company. The cross-sectional questionnaire survey was conducted via the Internet in November 2007. The measures were awareness of the Japanese Food Guide, eating knowledge scores, eating attitude scores, and eating behaviors scores, according to the recommendations of the Health Japan 21 and the Food Balance Guide Spinning Top. Obesity was assessed by self-reported body mass index (BMI) and waist circumference. The

relationships between awareness of the Japanese Food Guide, eating knowledge scores, eating attitude scores, eating behavior scores, and obesity were analyzed using path analysis. Path analysis revealed that the awareness of the Japanese Food Guide was associated with BMI and waist circumference via eating behavior score. Additionally, eating knowledge scores and eating attitude scores were mediators of the association with awareness of the Japanese Food Guide and eating behavior scores. These results suggest that promotion of the Japanese Food Guide would be an effective strategy for a healthy eating strategy to be implemented and to prevent obesity in the Japanese population.

## **The influence of menstrual cycle on oxidative stress responses to endurance exercise: a non-invasive study using saliva**

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The purpose of this study was to investigate exercise-induced changes in oxidative stress in different phases of the menstrual cycle. We used saliva samples which can be collected non-invasively. Seven healthy sedentary females were investigated for the variations in the oxidative stress, at rest during the menstrual cycle (menstrual, follicular and luteal phases). To assess the effects of endurance exercise on the oxidative stress and related parameters, each subject performed 60 minutes of moderate-intensity exercise on the bicycle ergometer protocol determined by the individual's anaerobic threshold (AT) in the follicular and luteal phases. The

saliva samples were collected five times, before, during and up to 60 minutes after exercise. Using saliva samples, we measured female sex hormone levels, oxidation-reduction potential (ORP), biological antioxidant potential, hydroperoxide levels,  $\alpha$ -amylase activity, cortisol, IL-6 and calprotectin levels. The resting oxidative stress levels determined by ORP were significantly higher in the menstrual phase than the follicular and luteal phases. The ORP significantly increased 30 minutes after exercise started and at the end of the 60-minute exercise session in the follicular phase. On the other hand, no significant effect of

exercise on the ORP response was found in the luteal phase. The menstrual cycle may affect oxidative stress levels at rest, whereas moderate endurance

exercise-induced increase in oxidative stress is likely to be accentuated in the follicular phase, among young women.

## **Prevalence and socio-demographic correlates of meeting the physical activity recommendation among Chinese adults**

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**Background:** Physical inactivity is a modifiable risk factor for many chronic diseases. Rapid economic development in China produced changes in lifestyle. The present study investigated the prevalence and socio-demographic correlates of meeting the physical activity recommendation among Chinese adults. **Methods:** Data were analyzed for 1394 Chinese adults who responded an Internet based cross-sectional survey. The International Physical Activity Questionnaire Chinese Version was used to determine whether the individuals met the recommended physical activity (150 minutes/week of moderate-intensity physical activity) on the CDC/ACSM physical activity guideline. Demographic data were also obtained. A multivariate logistic regression analysis was utilized. **Results:** Overall, 87.3% of respondents met the physical activity

recommendation. Age and annual income were significantly associated with meeting the physical activity recommendation. Women aged 40-49 years were more likely to meet the physical activity recommendation than those aged 30-39 years. Women with annual incomes of 40000-50000 Yuan were more likely to meet the physical activity recommendation than those with annual incomes of 30000 Yuan or less. **Conclusions:** The majority of Chinese adults in the present study met the CDC/ACSM physical activity recommendation. Age and annual incomes revealed as socio-demographic correlates in women. Thus, specific strategies accounting for such socio-demographic correlates may be needed for effectively promoting physical activity among Chinese adults.